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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

/Allan Olsen/

Primary Examiner, Art Unit 1792ADVISORY ACTION

Applicant's arguments filed February 19, 2008 have been fully considered but they are not persuasive.

Under the heading “The Office Action Does Not Consider the Claimed Invention As a Whole”, applicant argues: “Neither over Chiu et al. or Satou et al. teach amended claim 1”.

In response to applicant's arguments against that neither reference individually teaches claim 1, it is noted that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references.[1]

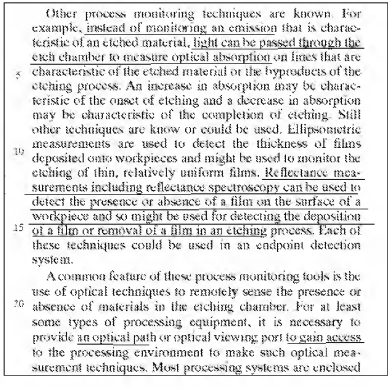
Applicant argues that Chiu et al. does not teach "applying an RF current through a multi-turn antenna above a chamber top surface of a wall of the process chamber" as claimed in claim 1. The examiner had previously recognized and acknowledged that Chiu et al. does not teach applying an RF current through a multi-turn antenna that is above a chamber top surface. Hence the claims stand rejected under 35 USC 103(a). The rejection relies upon Sato for teaching this aspect of the claimed invention.

Additionally, applicant argues that Chiu et al. does not teach directing radiation onto the substrate surface through the chamber top surface and wall of the process chamber as claimed. Applicant argues Chiu et al. teach spectroscopically monitoring the plasma process by measuring emissions or absorptions, or fluorescence that are

[1] See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

generated from emissions inside the chamber, which applicant argues does not read on the claimed process step of "directing radiation onto the substrate surface through the chamber top surface and wall of the process chamber".

The examiner notes that column 2 of Chiu includes:



Other process monitoring techniques are known. For example, instead of monitoring an emission that is characteristic of an etched material, light can be passed through the etch chamber to measure optical absorption on lines that are characteristic of the etched material or the byproducts of the etching process. An increase in absorption may be characteristic of the onset of etching and a decrease in absorption may be characteristic of the completion of etching. Still other techniques are know or could be used. Ellipsometric measurements are used to detect the thickness of films deposited onto workpieces and might be used to monitor the etching of thin, relatively uniform films. Reflectance measurements including reflectance spectroscopy can be used to detect the presence or absence of a film on the surface of a workpiece and so might be used for detecting the deposition of a film or removal of a film in an etching process. Each of these techniques could be used in an endpoint detection system.

A common feature of these process monitoring tools is the use of optical techniques to remotely sense the presence or absence of materials in the etching chamber. For at least some types of processing equipment, it is necessary to provide an optical path or optical viewing port to gain access to the processing environment to make such optical measurement techniques. Most processing systems are enclosed

Chiu's teaching to use absorption measurements and reflectance measurement to determine film thickness is indicative of spectroscopic techniques wherein radiation is directed onto the substrate surface through the chamber top surface and wall of the process chamber.

Next, applicant argues that Chiu et al. does not teach collimating limitation. Applicant notes that the word "collimated" means "to bring into line; make parallel" and Chiu's use of a lens to the collect light as noted by the examiner does not mean that

Chiu et al. is teaching collimating the radiation, i.e., making the radiation parallel. Light can be collected by a lens without the lens making the light parallel.

The examiner acknowledges that applicant is technically correct in that a lens may, but does not necessarily collimate light. Nevertheless, the examiner notes that Chiu teaches using optical fiber. As such, the light is "brought into line" and confined to traveling in essentially two dimensions. Light traveling down a fiber optic is collimated.

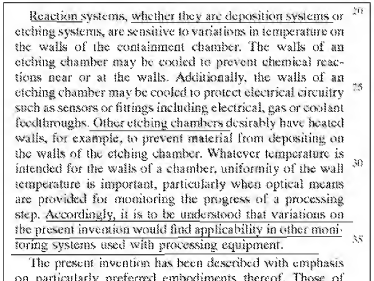
Next, applicant argues that Satou et al. does not cure the deficiencies of Chiu et al. Applicant notes the Office Action cites Satou et al. for teaching ICP plasma reactors having the claimed coil configurations and applicant argues that the present claims are directed to a process and not a chamber or coil configuration and that Satou et al. or Chiu et al. must teach claimed process as a whole. Applicant argues that neither Satou et al. nor Chiu et al. teach or suggest a process step which involves "directing radiation onto the substrate surface through the chamber top surface and wall of the process chamber" and they do not teach collimating the detected radiation and evaluating the detected collimated radiation. Thus clearly, Chiu et al. and Satou et al. do not teach or suggest claim 1 as a whole. Applicant continues by arguing that "Chiu et al. and Satou et al. do not Motivate or Suggest the Desirability of the Claimed Combination" and states "in suggesting the combination, the Office Action has not explained why one of ordinary skill in the art would be motivated to modify the process taught by Chiu et al. to apply a chamber design taught by Satou et al. There is no teaching or suggestion in Chiu et al or Satou et al. that would motivate one of ordinary skill in the art to apply the process monitoring system taught by Chiu et al. to the type of chamber and external

antenna taught by Satou et al." Applicant continues and argues that placing the antenna taught by Satou et al. in the path of the radiation and optical fiber taught by Chiu et al. might make Chiu et al. rather upset, as now it would be even more difficult for Chiu et al. to detect the radiation at the location chosen by Chiu et al. which is in the same region of the chamber. Thus one of ordinary skill in the would not be motivated to apply the coil configurations taught by Satou et al. to the fluorescence/emission endpoint method taught by Chiu et al. to derive the present claims.

The examiner respectfully disagrees. In the first place, Chiu et al. make it very clear that the method is generally applicable to ICP plasma chamber. Column 4 of Chiu includes:

> FIG. 1 schematically illustrates an electron cyclotron resonance etcher which might be, for example, the Hitachi 30 308-ATE metal etching system or a similar etching system.

And Column 7 includes:



Reaction systems, whether they are deposition systems or etching systems, are sensitive to variations in temperature on the walls of the containment chamber. The walls of an etching chamber may be cooled to prevent chemical reactions near or at the walls. Additionally, the walls of an etching chamber may be cooled to protect electrical circuitry such as sensors or fittings including electrical, gas or coolant feedthroughs. Other etching chambers desirably have heated walls, for example, to prevent material from depositing on the walls of the etching chamber. Whatever temperature is intended for the walls of a chamber, uniformity of the wall temperature is important, particularly when optical means are provided for monitoring the progress of a processing step. Accordingly, it is to be understood that variations on the present invention would find applicability in other monitoring systems used with processing equipment.

The present invention has been described with emphasis on particularly preferred embodiments thereof. Those of ordinary skill in the art will appreciate that variations and modifications might be made to the present invention without varying from the basic teachings thereof. The scope of the present invention is therefore to be determined from the following claims.

Regarding the argument that: "placing the antenna taught by Satou et al. in the path of the radiation and optical fiber taught by Chiu et al. might make Chiu et al. rather upset, as now it would be even more difficult for Chiu et al. to detect the radiation at the location chosen by Chiu et al. which is in the same region of the chamber", the examiner notes that Chiu already teaches a process wherein the optical monitoring fiber passes through the coil. There is nothing in the suggested combination that would exacerbate the optical monitoring of Chiu. The combination only takes the coil in conjunction with the optical fiber and moves it from the side wall to the top surface. The motivation to combine stems from the fact that Chiu is generally applicable to ICP process chambers and Satou teach an ICP chamber design that could equally benefit from Chiu's monitoring method.

Lastly, applicant argues that modifying the process taught by Chiu et al. by applying a chamber design taught by Satou et al. would not necessarily give a reasonable expectation of success to one skilled in the art.

The examiner respectfully disagrees because there is nothing that is fundamentally different in Chiu's method when the coil is relocated. One skilled in the art should fully expect Chiu's method to be applicable to other systems, especially since Chiu suggest using other systems.

/Allan Olsen/

Primary Examiner, Art Unit 1792